

IN THE CLAIMS:

Claims 2, 23, 28 through 30, and 41 were previously cancelled. Claims 1, 5, 6, 7, 11, 14, 18, 19, 24, 25, 26, 31, 34, 35, 36, 38, 42, and 43 have been amended herein. All of the pending claims are presented below. This listing of claims will replace all prior versions and listings of claims in the application. Please enter these claims as amended.

1. (Currently amended) A method of forming a microelectronic structure, the method comprising:
  - forming an oxide layer upon a semiconductor substrate;
  - forming a first dielectric layer upon the oxide layer;
  - selectively removing the first dielectric layer to expose the oxide layer at a plurality of areas;
  - forming a second dielectric layer over the oxide layer and the first dielectric layer, wherein the forming a second dielectric layer includes forming a second dielectric layer over and in contact with the exposed oxide layer at the plurality of areas;
  - selectively removing the second dielectric layer to form a plurality of spacers from the second dielectric layer, wherein each spacer is situated upon the oxide layer, is in contact with the first dielectric layer, and is adjacent to an area of the plurality of areas;
  - forming a plurality of isolation trenches extending below the oxide layer into the semiconductor substrate, wherein each isolation trench is adjacent to and below a pair of the spacers and is situated at a corresponding area of the plurality of areas, and wherein each isolation trench has a top edge;
  - forming a liner upon a sidewall of each isolation trench;
  - filling each isolation trench with a conformal layer, the conformal layer extending above the oxide layer in contact with a corresponding pair of the spacers, wherein the filling is performed by depositing the conformal layer, and the depositing is carried out to the extent of filling each isolation trench and extending over the spacers and over the first dielectric layer so as to define an upper surface contour of the conformal layer; and layer;
  - substantially simultaneously subjecting the entire upper surface contour of the conformal layer to a planarizing process and planarizing the conformal layer at least to the first dielectric

layer and each spacer to form therefrom an upper surface for each isolation trench that is co-planar to the other upper surfaces; and

fusing the oxide layer, liner, spacers and conformal layer;

wherein the conformal layer comprises a material that is electrically insulative and extends continuously between and within the plurality of isolation trenches.

2. (Cancelled)

3. (Previously presented) The method according to Claim 1, wherein the liner is a thermally grown oxide of the semiconductor substrate.

4. (Previously presented) The method according to Claim 1, wherein forming the liner upon the sidewall of the isolation trench comprises deposition of a composition of matter.

5. (Currently amended) The method according to Claim 1, further comprising forming a doped region below the termination of ~~each the~~ each isolation trench within the semiconductor substrate.

6. (Currently amended) The method according to Claim 1, wherein the upper surface for ~~each the~~ each isolation trench is formed by ~~chemical mechanical~~ chemical-mechanical planarization.

7. (Currently amended) A method of forming a microelectronic structure, the method comprising:

forming a first dielectric layer upon an oxide layer over a semiconductor substrate;

selectively removing the first dielectric layer to expose the oxide layer at a plurality of areas;

forming a second dielectric layer over the oxide layer and the first dielectric layer, wherein the

forming a second dielectric layer includes forming a second dielectric layer on and in contact with the exposed oxide layer at the plurality of areas;

selectively removing the second dielectric layer to form a plurality of spacers from the second dielectric layer, wherein each spacer is situated upon the oxide layer, is in contact with the first dielectric layer, and is adjacent to an area of the plurality of areas; forming a plurality of isolation trenches extending below the oxide layer into the semiconductor substrate, wherein each isolation trench is adjacent to and below a pair of the spacers and is situated at a corresponding area of the plurality of areas, and wherein each isolation trench has an edge; rounding ~~the~~ a top edge of each of the plurality of isolation trenches; filling each isolation trench with a conformal layer, the conformal layer extending above the oxide layer in contact with a corresponding pair of the spacers, wherein filling is performed by depositing the conformal layer and depositing is carried out to the extent of filling each isolation trench and extending over the spacers and over the first dielectric layer so as to define an upper surface contour of the conformal layer; substantially simultaneously subjecting ~~the~~ an entire upper surface contour of the conformal layer to a planarizing process and planarizing the conformal layer to form therefrom an upper surface for each isolation trench that is co-planar to the other upper surfaces; and fusing the oxide layer, spacers and conformal layer; wherein:

the conformal layer comprises a material that is electrically insulative and extends continuously between and within the plurality of isolation trenches; the conformal layer and the spacers form the upper surface for each isolation trench, each upper surface being formed from the conformal layer and the ~~spac~~ spacers and being situated above the oxide layer; and the first dielectric layer is in contact with at least a pair of the spacers and the oxide layer.

8. (Previously presented) The method according to Claim 7, further comprising: removing the oxide layer upon a portion of a surface of the semiconductor substrate; and forming a gate oxide layer upon the portion of the surface of the semiconductor substrate.

9. (Previously presented) The method according to Claim 7, wherein planarizing the conformal layer comprises using an etch recipe that etches the conformal layer faster than the first dielectric layer by a ratio in a range from about 1:1 to about 2:1.

10. (Previously presented) The method according to Claim 9, wherein the ratio is in a range from about 1.3:1 to about 1.7:1.

11. (Currently amended) The method according to Claim 7, wherein the upper surface for ~~each the~~ each isolation trench is formed by: ~~chemical mechanical~~chemical-mechanical planarization, wherein the conformal layer, the spacers, and the first dielectric layer form a planar first upper surface; and an etch that forms a second upper surface, the second upper surface being situated above ~~the pad~~ the oxide layer.

12. (Previously presented) The method according to Claim 11, wherein the etch uses an etch recipe that etches the conformal layer faster than the first dielectric layer by a ratio in a range from about 1:1 to about 2:1.

13. (Previously presented) The method according to Claim 12, wherein the ratio is in a range from about 1.3:1 to about 1.7:1.

14. (Currently amended) A method of forming a microelectronic structure, the method comprising:  
forming an oxide layer upon a semiconductor substrate;  
forming a silicon nitride layer upon the oxide layer;  
selectively removing the silicon nitride layer to expose the oxide layer at a plurality of areas;  
forming a first silicon dioxide layer over the oxide layer and over the silicon nitride layer, wherein forming a first silicon dioxide layer includes forming a first silicon dioxide layer on and in contact with the exposed oxide layer at the plurality of areas;

selectively removing the first silicon dioxide layer to form a plurality of spacers from the first silicon dioxide layer, wherein each spacer is situated upon the oxide layer, is in contact with the silicon nitride layer, and is adjacent to an area of the plurality of areas; forming a plurality of isolation trenches extending below the oxide layer into and terminating within the semiconductor substrate, wherein each isolation trench is adjacent to and below a pair of the spacers and is situated at a corresponding area of the plurality of areas, and wherein each isolation trench has a top edge; forming a corresponding electrically active region below the termination of each isolation trench within the semiconductor substrate; forming a liner upon a sidewall of each isolation trench, the liner being confined preferentially within each isolation trench and extending from an interface thereof with the oxide layer to the termination of the isolation trench within the semiconductor substrate; filling each isolation trench with a conformal second silicon dioxide layer, the conformal second silicon dioxide layer within each isolation trench extending above the oxide layer in contact with the corresponding pair of the spacers, wherein filling is performed by depositing the conformal second silicon dioxide layer, and depositing is carried out to the extent of filling each isolation trench and extending over the spacers and the silicon nitride layer so as to define an upper surface contour of the conformal second silicon dioxide layer; substantially simultaneously subjecting ~~the~~ an entire upper surface contour of the conformal second silicon dioxide layer to a planarizing process so as to remove the conformal second silicon dioxide layer and the spacers to form an upper surface for each isolation trench that is co-planar to the other upper surfaces and being situated above ~~the pad~~ the oxide layer, wherein a material that is electrically insulative extends continuously between and within the plurality of isolation trenches; and fusing the oxide layer, liner, spacers and conformal second silicon dioxide layer.

15. (Previously presented) The method according to Claim 14, wherein the liner is a thermally grown oxide of the semiconductor substrate.

16. (Previously presented) The method according to Claim 14, wherein the liner is composed of silicon nitride.

17. (Previously presented) The method according to Claim 15, further comprising: removing the oxide layer upon a portion of a surface of the semiconductor substrate; and forming a gate oxide layer upon the portion of the surface of the semiconductor substrate.

18. (Currently amended) A method of forming a microelectronic structure, the method comprising:

forming an oxide layer upon a semiconductor substrate;

forming a polysilicon layer upon the oxide layer;

forming a first dielectric layer upon the polysilicon layer;

selectively removing the first dielectric layer and the polysilicon layer to expose the oxide layer at a plurality of areas;

forming a second dielectric layer conformally over the oxide layer, the polysilicon layer, and the first dielectric layer, wherein the forming a second dielectric layer includes forming a second dielectric layer on and in contact with the exposed oxide layer at the plurality of areas;

selectively removing the second dielectric layer to form a plurality of spacers from the second dielectric layer, wherein each spacer is upon the oxide layer, is in contact with both the polysilicon layer and the first dielectric layer, and is adjacent to an area of the plurality of areas;

forming a plurality of isolation trenches extending below the oxide layer and from top edges into and terminating within the semiconductor substrate, wherein each isolation trench is adjacent to and below a pair of the spacers and is situated at a corresponding area of the plurality of areas;

rounding the top edges of each of the isolation trenches;

filling each isolation trench with a conformal third layer, the conformal third layer extending above the oxide layer in contact with a corresponding pair of the spacers, wherein filling is performed by depositing the conformal third layer, and depositing is carried out to the extent of filling each isolation trench and extending over the spacers and over the first dielectric layer so as to define an upper surface contour of the conformal third layer; substantially simultaneously subjecting ~~the~~ an entire upper surface contour of the conformal third layer to a planarizing process and planarizing the conformal third layer to form therefrom an upper surface for each ~~said~~ isolation trench that is co-planar to the other ~~said~~ upper surfaces; and

fusing the oxide layer, spacers and conformal third layer;

wherein a material that is electrically insulative extends continuously between and within the plurality of isolation trenches; and

wherein the microelectronic structure is defined at least in part by the plurality of spacers, the conformal third layer, and the plurality of isolation trenches.

19. (Currently amended) The method according to Claim 18, wherein the upper surface for each isolation trench is formed by ~~chemical mechanical~~ chemical-mechanical planarization.

20. (Previously presented) The method according to Claim 18, further comprising forming a doped region below the termination of each isolation trench within the semiconductor substrate.

21. (Previously presented) A method according to Claim 18, wherein rounding the top edges of each of the isolation trenches comprises forming a liner upon a sidewall of each isolation trench, the liner being confined preferentially within each isolation trench and extending from an interface thereof with the oxide layer to the termination of the isolation trench within the semiconductor substrate, and wherein the conformal third layer is composed of an electrically insulative material.

22. (Previously presented) The method according to Claim 21, wherein the liner is a thermally grown oxide of the semiconductor substrate.

23. (Cancelled)

24. (Currently amended) A method of forming a microelectronic structure, the method comprising:

forming an oxide layer upon a semiconductor substrate;

forming a polysilicon layer upon the oxide layer;

forming a first dielectric layer upon the polysilicon layer;

selectively removing the first dielectric layer and the polysilicon layer to expose the oxide layer at a plurality of areas;

forming a second dielectric layer conformally over the oxide layer, the polysilicon layer, and the first dielectric layer, wherein forming a second dielectric layer includes forming a second dielectric layer on and in contact with the exposed oxide layer at the plurality of areas;

selectively removing the second dielectric layer to form a plurality of spacers from the second dielectric layer, wherein each spacer is upon the oxide layer, is in contact with both the polysilicon layer and the first dielectric layer, and is adjacent to an area of the plurality of areas;

forming a plurality of isolation trenches extending below the oxide layer and from top edges into and terminating within the semiconductor substrate, wherein each isolation trench of the plurality of isolation trenches is adjacent to and below a pair of the spacers and is situated at a corresponding area of the plurality of areas;

rounding the top edges of each isolation trench of the plurality of isolation trenches;

filling each isolation trench of the plurality of isolation trenches with a conformal third layer, the conformal third layer extending above the oxide layer in contact with a corresponding pair of the spacers, wherein filling is performed by depositing the conformal third layer, and depositing is carried out to the extent of filling each isolation trench and extending

over the spacers and over the first dielectric layer so as to define an upper surface contour of the conformal third layer;

substantially simultaneously subjecting ~~the~~ an entire upper surface contour of the conformal third layer to a planarizing process and planarizing the conformal third layer to form therefrom an upper surface for each isolation trench of the plurality of isolation trenches that is co-planar to the other upper surfaces; and

fusing the oxide layer, spacers and conformal third layer; layer;

wherein the conformal third layer is an electrically insulative material that extends continuously between and within the plurality of isolation trenches;

wherein the upper surface for each isolation trench of the plurality of isolation trenches is formed from the conformal third layer, the spacers, and the first dielectric layer; and

wherein the microelectronic structure is defined at least in part by the plurality of spacers, the conformal third layer, and the plurality of isolation trenches.

25. (Currently amended) A method of forming a microelectronic structure, the method comprising:

forming an oxide layer upon a semiconductor substrate;

forming a polysilicon layer upon the oxide layer;

forming a first dielectric layer upon the polysilicon layer;

selectively removing the first dielectric layer and the polysilicon layer to expose the oxide layer at a plurality of areas;

forming a second dielectric layer conformally over the oxide layer, the polysilicon layer, and the first dielectric layer, wherein the forming a second dielectric layer includes forming a second dielectric layer on and in contact with the exposed oxide layer at the plurality of areas;

selectively removing the second dielectric layer to form a plurality of spacers from the second dielectric layer, wherein each spacer of the plurality of spacers is upon the oxide layer, is in contact with both the polysilicon layer and the first dielectric layer, and is adjacent to an area of the plurality of areas;

forming a plurality of isolation trenches extending below the oxide layer and from top edges into and terminating within the semiconductor substrate, wherein each isolation trench of the plurality of isolation trenches is adjacent to and below a pair of the spacers and is situated at a corresponding area of the plurality of areas;

rounding the top edges of each of the isolation trenches;

filling each isolation trench with a conformal third layer, the conformal third layer extending above the oxide layer in contact with a corresponding pair of the spacers, wherein filling is performed by depositing the conformal third layer, and depositing is carried out to the extent of filling each isolation trench and extending over the spacers and over the first dielectric layer so as to define an upper surface contour of the conformal third layer; substantially simultaneously subjecting ~~the~~ an entire upper surface contour of the conformal third layer to a planarizing process and planarizing the conformal third layer to form therefrom an upper surface for each isolation trench that is co-planar to the other upper surfaces;

exposing the oxide layer upon a portion of a surface of the semiconductor substrate;

forming a gate oxide layer upon the portion of the surface of the semiconductor substrate;

forming between the plurality of isolation trenches, and confined in the space therebetween, a layer composed of polysilicon upon the oxide layer in contact with a pair of the spacers;

selectively removing the third layer, the spacers, and the layer composed of polysilicon to form a portion of at least one of the upper surfaces; and

fusing the oxide layer, spacers and conformal third layer;

wherein a material that is electrically insulative extends continuously between and within the plurality of isolation trenches.

26. (Currently amended) A method of forming a microelectronic structure, the method comprising:

forming an oxide layer upon a semiconductor substrate;

forming a polysilicon layer upon the oxide layer;

forming a first dielectric layer upon the polysilicon layer;

selectively removing the first dielectric layer and the polysilicon layer to expose the oxide layer at a plurality of areas;

forming a second dielectric layer conformally over the oxide layer, the polysilicon layer, and the first dielectric layer, wherein the forming a second dielectric layer includes forming a second dielectric layer on and in contact with the exposed oxide layer at the plurality of areas;

selectively removing the second dielectric layer to form a plurality of spacers from the second dielectric layer, wherein each spacer of the plurality of spacers is upon the oxide layer, is in contact with both the polysilicon layer and the first dielectric layer, and is adjacent to an area of the plurality of areas;

forming a plurality of isolation trenches extending below the oxide layer and from top edges into and terminating within the semiconductor substrate, wherein each isolation trench of the plurality of isolation trenches is adjacent to and below a pair of the spacers and is situated at a corresponding area of the plurality of areas;

rounding the top edges of each isolation trench of the plurality of isolation trenches;

filling each isolation trench with a conformal third layer, the conformal third layer extending above the oxide layer in contact with a corresponding pair of the spacers, wherein filling is performed by depositing the conformal third layer, and depositing is carried out to the extent of filling each isolation trench and extending over the spacers and over the first dielectric layer so as to define an upper surface contour of the conformal third layer;

substantially simultaneously subjecting ~~the~~ an entire upper surface contour of the conformal third layer to a planarizing process comprising an etch recipe that etches the conformal third layer and the spacers faster than the first dielectric by a ratio in a range ~~from~~ of ~~from~~ about 1:1 to about 2:1 and planarizing the conformal third layer to form therefrom an upper surface for each isolation trench that is co-planar to the other upper surfaces; and fusing the oxide layer, spacers and conformal third layer; wherein a material that is electrically insulative extends continuously between and within the plurality of isolation trenches; and wherein the microelectronic structure is defined at least in part by the plurality of spacers, the conformal third layer, and the plurality of isolation trenches.

27. (Previously presented) The method according to Claim 26, wherein the ratio is in a range from about 1.3:1 to about 1.7:1.

28.-30. (Cancelled)

31. (Currently amended) A method of forming a microelectronic structure, the method comprising:  
forming a pad oxide layer upon a semiconductor substrate;  
forming a polysilicon layer upon the pad oxide layer;  
forming a silicon nitride layer upon the polysilicon layer;  
selectively removing the silicon nitride layer and the polysilicon layer to expose the pad oxide layer at a plurality of areas;  
forming a first silicon dioxide layer over the pad oxide layer and over the silicon nitride layer, wherein the forming a first silicon dioxide layer includes forming a first silicon dioxide layer on and in contact with the exposed pad oxide layer at the plurality of areas;

selectively removing the first silicon dioxide layer to form a plurality of spacers from the first silicon dioxide layer, wherein each spacer of the plurality of spacers is situated upon the pad oxide layer, is in contact with the silicon nitride layer and the polysilicon layer, and is adjacent to an area of the plurality of areas;

forming a plurality of isolation trenches extending below the pad oxide layer and from top edges into and terminating within the semiconductor substrate, wherein each isolation trench of the plurality of isolation trenches is adjacent to and below a pair of the spacers and is situated at a corresponding area of the plurality of areas;

forming a corresponding doped region below the termination of each isolation trench within the semiconductor substrate;

forming a liner upon a sidewall of each isolation trench, each liner extending from an interface thereof with the pad oxide layer to the termination of the isolation trench within the semiconductor substrate;

rounding the top edges of the isolation trenches;

filling each isolation trench with a conformal second layer, the conformal second layer extending above the pad oxide layer in contact with a corresponding pair of the spacers, wherein filling is performed by depositing the conformal second layer, and depositing is carried out to the extent of filling each isolation trench and extending over the spacers and over the silicon nitride layer so as to define an upper surface contour of the conformal second layer;

substantially simultaneously subjecting ~~the~~ an entire upper surface contour of the conformal second layer to a planarizing process and planarizing the conformal second layer and each of the spacers to form therefrom an upper surface for each isolation trench that is co-planar to the other upper surfaces and is situated above the pad oxide layer; and

fusing the pad oxide layer, liner, spacers and conformal second layer;

wherein a material that is electrically insulative extends continuously between and within the plurality of isolation trenches.

32. (Previously presented) The method according to Claim 31, wherein each liner is a thermally grown oxide of the semiconductor substrate, and wherein the conformal second layer is composed of an electrically insulative material.

33. (Previously presented) The method according to Claim 31, wherein each liner is composed of silicon nitride, and wherein the conformal second layer is composed of an electrically insulative material.

34. (Currently amended) The method according to Claim 31, further comprising: exposing the pad oxide layer upon a portion of a surface of the semiconductor substrate; forming a gate oxide layer upon the portion of the surface of the semiconductor substrate; forming between the plurality of isolation trenches, and confined in the a space therebetween, a layer composed of polysilicon upon the gate oxide layer in contact with a pair of the spacers, and selectively removing the layer composed of polysilicon to form a portion of at least one of the upper surfaces.

35. (Currently amended) A method for forming a microelectronic structure, the method comprising:  
providing a semiconductor substrate having a top surface with an oxide layer thereon;  
forming a polysilicon layer upon the oxide layer;  
forming a first layer upon the polysilicon layer;  
selectively removing the first layer and the polysilicon layer to expose the oxide layer at a plurality of areas;  
forming a plurality of isolation trenches through the exposed oxide layer at the plurality of areas, wherein an electrically insulative material extends continuously between and within the plurality of isolation trenches, each isolation trench:  
having a spacer composed of a dielectric material upon the oxide layer in contact with the first layer and the polysilicon layer;

extending from an opening thereto at the top surface of the semiconductor substrate and below the oxide layer into and terminating within the semiconductor substrate adjacent to and below the spacer;

having a second layer filling the isolation trench and extending above the oxide layer in contact with the spacer, wherein filling is performed by depositing the second layer, and depositing is carried out to the extent of filling each isolation trench and extending over the spacer and over the first layer so as to define an upper surface contour of the second layer; and

having a planar upper surface formed from the second layer and the spacer and being situated above the oxide layer, wherein the planar upper surface is formed by substantially simultaneously subjecting ~~the~~ an entire upper surface contour of the second layer to a planarizing process; and

fusing the oxide layer, spacer and second layer;

wherein the microelectronic structure is defined at least in part by ~~the~~ a plurality of spacers, the second layer, and the plurality of isolation trenches.

36. (Currently amended) The method as defined in Claim 35, further comprising: doping the semiconductor substrate with a dopant having a first conductivity type; and doping the semiconductor substrate below each isolation trench with a dopant having a second conductivity type opposite the first conductivity type to form a doped trench bottom that is below and in contact with a respective one isolation trench of the plurality of isolation trenches.

37. (Previously presented) The method as defined in Claim 36, wherein the doped trench bottom has a width, each isolation trench has a width, and the width of each doped trench bottom is greater than the width of the respective isolation trench.

38. (Currently amended) A method for forming a microelectronic structure, the method comprising:

providing a semiconductor substrate having a top surface with an oxide layer thereon;

forming a first layer upon the oxide layer;

selectively removing the first layer to expose the oxide layer at a plurality of areas;

forming a plurality of isolation trenches through the oxide layer at the plurality of areas, wherein an electrically insulative material extends continuously between and within the plurality of isolation trenches without filling the plurality of isolation trenches, each isolation trench:

having a spacer composed of a dielectric material upon the oxide layer in contact with the first layer;

extending from an opening thereto at the top surface of the semiconductor substrate and below the oxide layer into and terminating within the semiconductor substrate adjacent to and below the spacer;

having a second layer filling the isolation trench and extending above the oxide layer in contact with the spacer, wherein filling is performed by depositing the second layer, and the depositing is carried out to the extent of filling each isolation trench and extending over the spacer and over the first layer so as to define an upper surface contour of the second layer; and

having a planar upper surface formed from the second layer and the spacer and being situated above the oxide layer, wherein the planar upper surface is formed by substantially simultaneously subjecting ~~the~~ an entire upper surface contour of the second layer to a planarizing process; and

fusing the oxide layer, electrically insulative material, spacer and second layer; wherein the microelectronic structure is defined at least in part by the plurality of spacers, the second layer, and the plurality of isolation trenches.

39. (Previously presented) The method as defined in Claim 38, further comprising: doping the semiconductor substrate with a dopant having a first conductivity type; and doping the semiconductor substrate below each isolation trench with a dopant having a second conductivity type opposite the first conductivity type to form a doped trench bottom that is below and in contact with a respective one of the isolation trenches.

40. (Previously presented) The method as defined in Claim 39, wherein: the doped trench bottom has a width; each isolation trench has a width; and the width of each doped trench bottom is greater than the width of the respective isolation trench.

41. (Cancelled)

42. (Currently amended) A method for forming a microelectronic structure, the method comprising:  
providing a semiconductor substrate having a top surface with an oxide layer thereon;  
forming a polysilicon layer upon the oxide layer;  
forming a first layer upon the polysilicon layer;  
forming a first isolation structure including:  
a first spacer composed of a dielectric material upon the oxide layer in contact with the first layer and the polysilicon layer;  
a first isolation trench extending from an opening thereto at top edges at the top surface of the semiconductor substrate and below the oxide layer into and terminating within the semiconductor substrate adjacent to and below the first spacer, wherein the first spacer is situated on a side of the first isolation trench, and wherein the first isolation trench has a top edge that is rounded; and  
a second spacer composed of a dielectric material upon the oxide layer in contact with the first layer and the polysilicon layer, the second spacer being situated on a side of the first isolation trench opposite the side of the first spacer;

forming a second isolation structure including:

- a first spacer composed of a dielectric material upon the oxide layer in contact with the first layer and the polysilicon layer;
- a first isolation trench extending from an opening thereto at top edges at the top surface of the semiconductor substrate and below the oxide layer into and terminating within the semiconductor substrate adjacent to and below the first spacer of the second isolation structure, wherein the first spacer of the second isolation structure is situated on a side of the first isolation trench, and wherein the first isolation trench in the second isolation structure has a top edge that is curved; and
- a second spacer composed of a dielectric material upon the oxide layer in contact with the first layer and the polysilicon layer, the second spacer of the second isolation structure being situated on a side of the first isolation trench opposite the side of the first spacer of the second isolation structure;

rounding the top edges of the isolation trenches;

forming an active area located within the semiconductor substrate between the first and second isolation structures;

forming a conformal second layer, composed of an electrically insulative material, filling the first and second isolation trenches and extending continuously therebetween and above the oxide layer in contact with the first and second spacers of the respective first and second isolation structures, wherein filling is performed by depositing the conformal second layer, and depositing is carried out to the an extent of filling each of the isolation trenches and extending over the spacers and over the first layer so as to define an upper surface contour of the conformal second layer;

substantially simultaneously subjecting the an entire upper surface contour of the second layer to a planarizing process;

forming a planar upper surface from the conformal second layer and the first and second spacers of the respective first and second isolation structures, and being situated above the oxide layer; and

fusing the oxide layer, first spacer, second spacer and conformal second layer of the first isolation structure and fusing the oxide layer, first spacer, second spacer and conformal second layer of the second isolation structure;

wherein the microelectronic structure is defined at least in part by the active area, the second layer, and the first and second isolation trenches.

43. (Currently amended) A method for forming a microelectronic structure, the method comprising:

providing a semiconductor substrate having a top surface with an oxide layer thereon;

forming a first layer upon the oxide layer;

forming a first isolation structure including:

a first spacer composed of a dielectric material upon the oxide layer in contact with the first layer;

a first isolation trench extending from an opening thereto at the top surface of the semiconductor substrate and below the oxide layer into and terminating within the semiconductor substrate adjacent to and below the first spacer, wherein the first spacer is situated on a side of the first isolation trench, and wherein the first isolation trench has a top edge that is rounded; and

a second spacer composed of a dielectric material upon the oxide layer in contact with the first layer, the second spacer being situated on a side of the first isolation trench opposite the side of the first spacer;

forming a second isolation structure including:

a first spacer composed of a dielectric material upon the oxide layer in contact with the first layer;

a first isolation trench extending below the oxide layer into and terminating within the semiconductor substrate adjacent to and below the first spacer of the second isolation structure, wherein the first spacer of the second isolation structure is situated on a side of the first isolation trench, and wherein the first isolation trench in the second isolation structure has a top edge that is rounded; and

a second spacer composed of a dielectric material upon the oxide layer in contact with the first layer, the second spacer of the second isolation structure being situated on a side of the first isolation trench opposite the side of the first spacer of the second isolation structure;

forming an active area located within the semiconductor substrate between the first and second isolation structures;

forming a conformal second layer composed of an electrically insulative material, conformally filling the first and second isolation trenches and extending continuously therebetween and above the oxide layer in contact with the first and second spacers of the respective first and second isolation structures, wherein filling is performed by depositing the conformal second layer, and depositing is carried out to the extent of filling each of the isolation trenches and extending over the spacers and over the first layer so as to define an upper surface contour of the conformal second layer;

substantially simultaneously subjecting ~~the~~ an entire upper surface contour of the second layer to a planarizing process and planarizing the conformal second layer and the first and second spacers of the respective first and second isolation structures to form a planar upper surface from the conformal second layer and the first and second spacers of the respective first and second isolation structures, and being situated above the oxide layer, wherein the microelectronic structure is defined at least in part by the active area, the conformal second layer, and the first and second isolation trenches; and

fusing the oxide layer, first spacer, second spacer and conformal second layer of the first isolation structure and fusing the oxide layer, first spacer, second spacer and conformal second layer of the second isolation structure.